We claim:

1. A method for making a stretchable fiber with a soft hand and good crock-fastness, color-fastness, abrasion resistance, and stain resistance, which comprises:

contacting a cellulosic fiber with a graft initiator;

contacting the cellulosic fiber with a composition comprising:

at least 5% of a polymerizable silicon oil emulsion;

between about 1% and about 15% of a urethane prepolymer emulsion; and

a second polymerizable prepolymer, wherein the composition is stable with less than 5% of the polymerizable material self-polymerizing at a temperature of between about 60° F and 90° F during storage over a period of at least 2 months; and

forming a grafted copolymer onto the cellulosic fiber substrate, said grafted copolymer comprising at least about 10% by weight of polymerized silicon oil.

2. The method of claim 1 wherein the grafted polymers comprise between about 2% and about 12% by weight of the fiber, and wherein at least about half of the grafted polymers remain after 15 wash cycles.

3. The method of claim 1 wherein the composition further comprises the graft initiator, wherein the composition comprises between about 6% to about 35% by weight of an aqueous silicone oil emulsion, and wherein the graft initiator comprises a salt of Fe, Ag, Co, Cu, or mixtures thereof.

4. The method of claim 1 wherein the fibers comprise cotton, the stable fluid composition comprising:

between about 0.8% and about 15% of acrylic prepolymer;

between about 0.4% and about 9% of a high molecular weight polymerizable organosilicone suspension;

between about 6% and about 35% of a polymerizable silicone oil emulsion;

between about 1.5% and about 12% of a urethane prepolymer emulsion;

between about 0.0004% and about 0.15% of a catalyst;

between about 0.0004% and about 0.15% of a graft initiator, wherein the solids content of the stable composition upon drying is at least about 5% by weight;

wherein in contacting the fibers pick-up between about 40 grams and about 200 grams of the stable composition to about 100 grams of fibers; and

wherein the grafted polymer is formed by exposure to a temperature sufficient for polymerization of polymers grafted onto the fiber.

5. The method of claim 4 wherein the stable composition further comprises:

between about 0.0004% and about 0.15% of a polyethylene glycol diacrylate; and

between about 0.0004% and about 0.15% of a urethane acrylate prepolymer.

6. The method of claim 4 wherein the stable composition comprises:

between about 2% and about 10% of acrylic prepolymer;

between about 0.8% and about 7% of a high molecular weight organosilicone suspension;

between about 8% and about 30% of a silicone oil emulsion;

between about 1.2% and about 8% of a urethane prepolymer emulsion;

between about 0.002% and about 0.1% of a catalyst;

between about 0.002% and about 0.1% of a graft initiator;

wherein the contacting picks-up between about 60 grams and about 140 grams of the stable composition to about 100 grams of cotton fibers; and

wherein the temperature is between about 250° F and 400° F and the time is between about 10 seconds and 10 minutes.

7. The method of claim 6 wherein the stable composition further comprises:

between about 0.002% and about 0.1% of a polyethylene glycol diacrylate; and

between about 0.002% and about 0.1% of a urethane acrylate prepolymer.

8. The method of claim 4 wherein the fibers are formed into fabric, wherein the fabric has at least about 4% of grafted polymers, and wherein the fabric after being stretched to about 1.5 times its original length for 30 seconds and relaxed will return to between 95% to about 110% of its original size within 30 seconds.

9. The method of claim 8 wherein the fabric when stretched and allowed to return for five cycles will return to between 95% to about 110% of its original size in each cycle.

10. The method of claim 7 wherein the stable composition comprises:

between about 2.4% and about 8% of acrylic prepolymer;

between about 1.2% and about 5% of a high molecular weight organosilicone suspension;

between about 10% and about 27% of a silicone oil emulsion;

between about 1.6% and about 6% of a urethane prepolymer emulsion;

between about 0.006% and about 0.05% of a catalyst;

between about 0.006% and about 0.05% of a graft initiator;

between about 0.006% and about 0.05% of a polyethylene glycol diacrylate; and

between about 0.006% and about 0.05% of a urethane acrylate prepolymer.

11. The method of claim 4 wherein the stable composition is provided by admixing between about 4 grams and about 50 grams of a stable concentrated composition comprising:

between about 4% and about 30% of acrylic prepolymer;

between about 2% and about 18% of a high molecular weight organosilicone suspension;

between about 30% and about 70% of a silicone oil emulsion;

between about 3% and about 24% of a urethane prepolymer emulsion;

between about 0.002% and about 0.3% of a catalyst;

between about 0.002% and about 0.3% of a graft initiator, wherein the concentrated composition is stable with less than 5% of the prepolymers self-polymerizing at a temperature of between about 60° F and 90° F during storage over a period of at least 2 months, and wherein the stable concentrated composition comprises between about 10% and about 35% solids when dried;

with water to form 100 grams of the stable composition.

12. The method of claim 11 wherein the stable concentrated composition further comprises:

between about 0.002% and about 0.3% of a polyethylene glycol diacrylate; and

between about 0.002% and about 0.3% of a urethane acrylate prepolymer.

13. The method of claim 12 wherein the stable concentrated composition comprises:

between about 12% and about 16% of acrylic prepolymer;
between about 6% and about 10% of a high molecular weight silicone;
between about 50% and about 55% of a silicone oil emulsion;
between about 8% and about 12% of a urethane prepolymer emulsion;
between about 0.03% and about 0.1% of a catalyst;
between about 0.03% and about 0.1% of a graft initiator;
between about 0.03% and about 0.1% of a polyethylene glycol diacrylate; and
between about 0.03% and about 0.1% of a urethane acrylate prepolymer

wherein the stable concentrated composition comprises between about 25% and about 30% solids when dried.

14. The method of claim 4 wherein the stretchable cotton fibers are in the form of textile, wherein the graft initiator comprises salts of Fe, Ag, Co, Cu, or mixtures thereof; and wherein the catalyst comprises a peroxide, peracid, perbenzoate, metabisulfite, or mixtures thereof.

15. The product of the process of claim 4.

16. The product of the process of claim 6.

17. The stable aqueous composition of claim 4.

18. The stable aqueous composition of claim 10.

19. The concentrated stable composition of claim 12.

20. The method of claim 1 which further comprises contacting the filaments or yarns with a solution of the first component by a dipping, spraying, or coating operation.

21. The method of claim 1 wherein the composition also comprises one or more of viscosity control agents, perfumes, emulsifiers, preservatives, UV light absorbers, antioxidants, bactericides, fungicides, colorants, dyes, fluorescent dyes, brighteners,

opacifiers, wettability modifiers, soil release agents, flame retardant, and shrinkage control agents.

22. The method of claim 21 wherein the wettability modifier is a polymerizable prepolymer in a quantity sufficient to make the fiber more hydrophobic than a fiber treated with a composition not including the wettability modifier.

23. The method of claim 22 wherein the wettability modifier is a polymerizable prepolymer containing an alkyl moiety.

24. The method of claim 21 wherein the wettability modifier is a polymerizable prepolymer in a quantity sufficient to make the fiber more hydrophillic than a fiber treated with a composition not including the wettability modifier.

25. The method of claim 24 wherein the wettability modifier is a polymerizable prepolymer containing an sulfonate, sulfate, or carboxyl moiety.

26. The method of claim 21 wherein the bactericide is a polymerizable prepolymer in a quantity sufficient to make the fiber more resistant to bacterial growth than a fiber treated with a composition not including the bactericide.

27. The method of claim 26 wherein the bactericide is a polymerizable prepolymer containing protonated amine.

28. The method of claim 21 wherein the flame retardant agent is a polymerizable prepolymer in a quantity sufficient to make the fiber more resistant to supporting a flame than a fiber treated with a composition not including the flame retardant agent.

29. The method of claim 28 wherein the flame retardant agent is a polymerizable prepolymer containing chlorine or bromine.

30. The method of claim 1 wherein the grafted polymers comprise between about 2% and about 12% by weight of the fiber, and wherein the strength ratio compared of fabric made of the grafted fiber is at least 125% compared to fabric made of ungrafted fiber.

31. A solution for forming a grafted substrate comprising

a graft initiator for activating sites on a substrate having active hydrogens;

a catalyst for activating the graft initiator;

a first component which includes a functional group for reaction with an activated site on the substrate for grafting the first component thereto and for forming an active site on the first component;

a second component which includes a functional group for reacting with an activated site on the substrate or the first component and for forming an active site on the second component; and

a third component which includes a organosilicone functional group,

wherein the first, second, and third components form a polymer grafted onto the substrate contacted by the solution to form a grafted substrate; and the second component comprises a material which imparts increased resilience to the grafted substrate while the first component comprises a material which imparts increased flexibility or pliability to the grafted substrate.